## REMARKS

**Status of Claims:**

Claim 2 remains cancelled. New claims 5-9 are added. Thus, claims 1 and 3-9 are present for examination.

**Claim Rejection:**

Claims 1, 3, and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hoshizaki et al. (U.S. Patent No. 5,922,651) (hereinafter Hoshizaki) in view of Okamoto et al. (JP-62157641) (hereinafter Okamoto).

With respect to claims 1, 3, and 4, as amended, the rejection is respectfully traversed.

Independent claim 1, as amended, recites a "method of producing a superconductor, comprising the step of forming a superconducting layer on a base layer by performing a film deposition at least three times without substantially changing an oxygen gas pressure between the at least three times, wherein a film thickness of a superconducting film made in each film deposition is 0.3 $\mu$m or less and the superconducting layer having a layer thickness of 0.75 $\mu$m to 3 $\mu$m is formed on the base layer and wherein the base layer is composed of Ni, Cr, Mn, Co, Fe, Pd, Cu, Ag or Au or an alloy of at least two of Ni, Cr, Mn, Co, Fe, Pd, Cu, Ag or Au." (Emphasis Added).

A method of producing a superconductor including the above-quoted features has at least the advantages that: (i) a superconducting layer is formed on a base layer by performing a film deposition at least three times without substantially changing an oxygen gas pressure between the at least three times; (ii) a film thickness of a superconducting film made in each film deposition is 0.3 $\mu$m or less; (iii) the superconducting layer is formed to have a layer thickness of 0.75 $\mu$m to 3 $\mu$m; and (iv) the base layer is composed of Ni, Cr, Mn, Co, Fe, Pd, Cu, Ag or Au or an alloy of at least two of Ni, Cr, Mn, Co, Fe, Pd, Cu, Ag or Au. (Specification; page 3, lines 1-15; page 4, line 2 to page 5, line 5; page 6, lines 1-2; page 7, lines 8-12; page 9, line 19 to page 10, line 11).

Neither Hoshizaki nor Okamoto, alone or in combination, disclose or suggest a method of producing a superconductor including the above-quoted features in which a superconducting layer is formed on a base layer by performing a film deposition at least three times without substantially changing an oxygen gas pressure between the at least three times.

In the method of Hoshizaki, for the purpose of introducing oxygen into a superconductive thin film, a film deposition step is repeated, and an oxygen introduction step is carried out after each film deposition step. (Hoshizaki; FIGs. 2 and 4; column 2, line 63 to column 3, line 19; column 5, lines 15-25 and lines 39-45; column 5, line 66 to column 6, line 25; column 10, lines 30-59). During deposition steps in the method of Hoshizaki, a first oxygen partial pressure of 1 Torr or lower, such as 0.15 Torr, is provided in a chamber. (Hoshizaki; column 5, line 66 to column 6, line 14; column 10, lines 35-40). Then, during oxygen introducing steps in the method of Hoshizaki that occur between the film deposition steps, a second oxygen partial pressure of 10 Torr or higher, such as 660 Torr, is provided in the chamber. (Hoshizaki; column 6, lines 15-25; column 10, lines 41-45). Therefore, the method of Hoshizaki requires substantially changing an oxygen gas pressure, from less than 1 Torr to greater than 10 Torr, between the deposition steps.

In contrast, embodiments of the present invention are characterized in that an oxygen introduction step for increasing an oxygen gas pressure is not interposed between the film deposition steps. Instead, in various embodiments of the present invention, a thickness of a film made in each film deposition is specified, film deposition is performed repeatedly until a predetermined layer thickness is achieved, and lastly, an oxygen introduction step may be carried out after all of the film deposition steps are completed, so as to form an oxide superconducting layer at a final stage. For example, in various embodiments of the present invention, an oxygen gas pressure may be kept constant at 200 mTorr during each film deposition and between the film depositions. By not changing an oxygen gas pressure between film depositions, various processes of the present invention are less complicated than the process of Hoshizaki, because changing oxygen gas pressure between film depositions adds significant complexity to the process.

Moreover, Okamoto does not cure the deficiencies with respect to the teachings of Hoshizaki noted above, because the process of Okamoto does not even allow for forming a superconducting layer on a base layer by performing a film deposition more than once. In the process of Okamoto, a normal conductor layer is deposited, and then a superconducting layer is deposited, and then the process repeats with a normal conductor layer being deposited before another superconducting layer is deposited. (Okamoto; abstract; FIGs. 1 and 2, references 2, 3, 7, and 8). This is evident from FIG. 1 of Okamoto, where it is shown that an Ag layer 2 is deposited, and then a $YBa_2Cu_3O_7$ layer 3 is deposited, and then another Ag layer 2 is deposited. (Okamoto; FIG. 1). Thus, a superconducting layer in the process of Okamoto is not formed by performing a film deposition more than once. As a consequence, Okamoto neither discloses nor suggests forming a superconducting layer on a base layer by performing a film deposition at least three times without substantially changing an oxygen gas pressure between the at least three times.

In addition, it should be noted that Okamoto requires changing materials between depositions of a normal conductor layer and a superconducting layer. For example, Okamoto requires changing deposition material from Ag to $YBa_2Cu_3O_7$. (Okamoto; FIG. 1). Such changing of material is typically done by opening a deposition chamber and replacing one deposition material with a different deposition material. Opening of the chamber would cause a change in oxygen gas pressure in the chamber. Okamoto neither discloses nor suggests any process other than a normal deposition process, which, as discussed above, will inherently require substantially changing an oxygen gas pressure between deposition of a normal conductor layer and a superconducting layer.

Therefore, independent claim 1, as amended, is neither disclosed nor suggested by the Hoshizaki and Okamoto references and, hence, is believed to be allowable.

Dependent claim 3, as amended, recites the "method according to claim 1, wherein a supply area velocity of the base layer in each film deposition is at least $0.04m^2/h$." The Examiner stated that, "the specification contains no disclosure of either the critical nature of the claimed supply velocity or any unexpected results arising therefrom." (Office Action; page 3).

However, the specification as filed at page 8, line 18 to page 9, line 2, states the following:

> "In the method for producing the superconductor according to the present invention, the supply area of the base layer per hour (hereinafter referred to as supply area velocity of the base layer) in each film deposition can be at least 0.04 $m^2/h$. **If the supply area velocity of the base layer is less than 0.04 m2/h when the substrate corresponds to the adjacent base layer, in some cases the reaction between the substrate and the superconducting layer formed thereon increases, whereby characteristics of the superconducting layer such as Ic and Jc are deteriorated**." (Specification; page 8, line 18 to page 9, line 2).

Thus, the specification does contain disclosure of the importance of having a supply area velocity of a base layer in each film deposition that is at least 0.04 $m^2/h$. This is because if the supply area velocity of the base layer is less than 0.04 $m^2/h$ when the substrate corresponds to the adjacent base layer, in some cases the reaction between the substrate and the superconducting layer formed thereon increases, whereby characteristics of the superconducting layer such as Ic and Jc are deteriorated. (Specification; page 8, line 18 to page 9, line 2).

In Okamoto, for the purpose of preventing diffusion of elements contained in a base layer, an element diffusion prevention layer is provided. In contrast, with embodiments of the present invention, by increasing the supply area velocity, the reaction time is shortened so that a diffusion of elements contained in the base layer may be prevented. Thus, the element diffusion prevention method in Okamoto is different from the technique of preventing element diffusion of embodiments of the present invention. Moreover, Hoshizaki neither discloses nor suggests having a supply area velocity of a base layer in each film deposition that is at least 0.04 $m^2/h$.

Therefore, dependent claim 3, as amended, is neither disclosed nor suggested by the Hoshizaki and Okamoto references, either alone or in combination, and, hence, dependent claim 3 is believed to be allowable.

Independent claim 4 recites a superconductor with features similar to features of a method of producing a superconductor of claim 1 and, thus, is believed to be allowable for at least the same reasons that independent claim 1 is believed to be allowable.

New dependent claims 5-9 recite features not found in either of the Hoshizaki and Okamoto references.

**Conclusion:**

Applicant believes that the present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 50-0872. Should no proper payment be enclosed herewith, as by a check or credit card payment form being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 50-0872.

If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicant hereby petitions for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 50-0872.

Respectfully submitted,

Date August 9, 2006 By _____

FOLEY & LARDNER LLP
Customer Number: 22428
Telephone: (310) 975-7963
Facsimile: (310) 557-8475

Ted R. Rittmaster
Attorney for Applicant
Registration No. 32,933